

CLAIM AMENDMENTS

1. (currently amended) In combination with a chuck, a
chuck actuator comprising:

a hollow housing having a chamber extending along an axis
and having a front end and a rear end;

a ring in the chamber forming with the front end thereof
a front compartment;

a piston in the chamber between the ring and the rear end
and forming an intermediate compartment with the ring and a rear
compartment with the rear end;

an axially extending stem on the piston projecting
forward through the ring and through the intermediate and front
compartments, adapted to engage and open [[a]] the chuck and knock
a tool from it, and formed with a region of enlarged diameter, the
piston being axially shiftable between a rear position with the
enlarged-diameter region offset rearward from the ring and with the
stem forming with the ring an axially extending passage between the
front and intermediate compartments and a front position with the
enlarged-diameter portion fitting snugly in the ring and
substantially closing the passage; and

means including ports opening into the compartments for
pressurizing the rear compartment and
depressurizing the front and intermediate
compartments for shifting the piston

24 forward at a speed slowing when the front
25 position is reached and for
26 pressurizing the front compartment and
27 intermediate compartments and
28 depressurizing the rear compartment for
29 shifting the position rearward into the
30 rear position.

1 2. (original) The chuck actuator defined in claim 1
2 wherein the stem is formed immediately forward of the enlarged-
3 diameter region with a forwardly smoothly tapered region, whereby
4 on forward shifting the piston slows smoothly as the tapered region
5 enters the ring.

1 3. (original) The chuck actuator defined in claim 1
2 wherein the ports include a vent port opening into the intermediate
3 compartment.

1 4. (original) The chuck actuator defined in claim 3
2 further comprising
3 means for varying the flow cross section of the vent
4 port.

1 5. (original) The chuck actuator defined in claim 4
2 wherein the means for varying includes a screw seated in the
3 housing and having a tapered tip engaged in the vent port.

1 6. (original) The chuck actuator defined in claim 1
2 wherein the housing and ring are both of two parts.

1 7. (currently amended) The chuck actuator defined in
2 claim 1 wherein the housing is provided with [[a]] front and rear
3 axial abutments spacedly flanking the ring and the ring is axially
4 displaceable between the abutments, whereby the ring bears against
5 the rear abutment when the front compartment is pressurized more
6 than the intermediate compartment.

1 8. (currently amended) ~~The chuck actuator defined in~~
2 ~~claim 7 wherein the ring is~~ A chuck actuator comprising:
3 a hollow housing having a chamber extending along an axis
4 and having a front end and a rear end and provided with front and
5 rear axial abutments;
6 a ring axially displaceable in the chamber between the
7 abutments, forming with the front end thereof a front compartment,
8 and formed with a bypass passage that is blocked by the rear
9 abutment when the ring bears thereon;
10 a piston in the chamber between the ring and the rear end
11 and forming an intermediate compartment with the ring and a rear
12 compartment with the rear end;
13 an axially extending stem on the piston projecting
14 forward through the ring and through the intermediate and front
15 compartments, adapted to engage and open a chuck and knock a tool
16 from it, and formed with a region of enlarged diameter, the piston
17 being axially shiftable between a rear position with the enlarged-
18 diameter region offset rearward from the ring and with the stem
19 forming with the ring an axially extending passage between the
20 front and intermediate compartments and a front position with the
21 enlarged-diameter portion fitting snugly in the ring and
22 substantially closing the passage; and
23 means including ports opening into the compartments for
24 pressurizing the rear compartment and
25 depressurizing the front and intermediate
26 compartments for shifting the piston

27 forward at a speed slowing when the front
28 position is reached and for
29 pressurizing the front compartment and
30 intermediate compartments and
31 depressurizing the rear compartment for
32 shifting the position rearward into the
33 rear position.

1 9. (original) The chuck actuator defined in claim 8
2 wherein the bypass passage is formed by a plurality of angularly
3 spaced notches cut in the ring.

1 10. (original) The chuck actuator defined in claim 7
2 wherein the abutments are spaced such that the ring can only move
3 through an axial stroke of between 0.1 mm and 1.5 mm.

1 11. (original) The chuck actuator defined in claim 1
2 wherein the ring has a tubularly cylindrical collar coaxially
3 surrounding the stem.